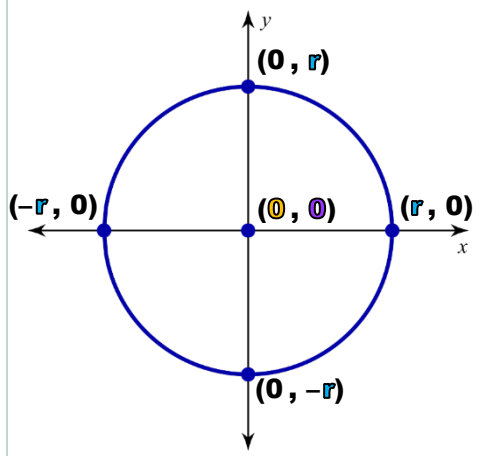


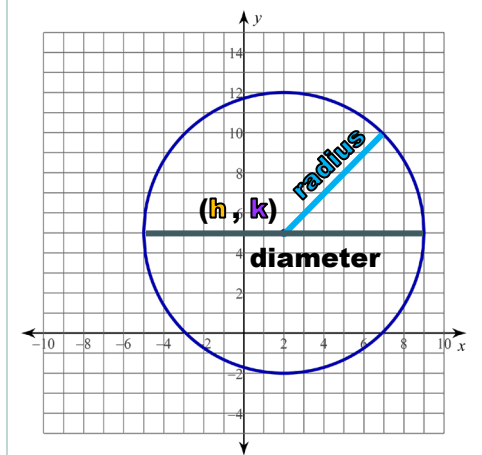
GUIDED NOTES (TEACHER GUIDE)

Explain

	<p>Equation of a Circle</p>
$x^2 + y^2 = r^2$	<p>center: $(0, 0)$</p>
<p>radius: r</p>	

Have students use one color to fill in the r for the radius, in both the equation and on the picture. Have students use different colors for the x -coordinate of the center and the y -coordinate of the center. This gives students color-coded reference notes for the equation and the picture. Have them do the same for the equation of any circle below.

Remind students that, even when we put a circle on the coordinate plane, the distance from the center is the radius. Be sure to emphasize that relationship between the radius and the center of the circle.

	<p>Equation of Any Circle</p>
$(x - h)^2 + (y - k)^2 = r^2$	<p>center: (h, k)</p>
<p>radius: r</p>	

This is a great time to show students what the equation of this circle would look like. The center is at $(2, 5)$, so we know that $h = 2$ and $k = 5$. By counting, we see the radius is 7. If we plug this information into the equation, we get $(x - 2)^2 + (y - 5)^2 = 49$.

1) Write the equation of a circle that has $(-6, 1)$ and $(4, 9)$ as the endpoints of its diameter.

Teacher	Students
What do we need to write the equation of a circle?	We need to know the center and the radius.
Where is the center of a circle?	The center is in between (perfectly in the middle of) the diameter's two endpoints.
How do we find the point exactly in the middle of two points?	Midpoint formula (average): $M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$
Let's calculate the midpoint (center).	$M = \left(\frac{(-6) + (4)}{2}, \frac{(1) + (9)}{2} \right) = \left(\frac{-2}{2}, \frac{10}{2} \right) = (-1, 5)$
How do we find the radius of a circle?	Two options: (1) find the diameter and divide it by two, or (2) find the distance between the center and a point on the circle.
How do we calculate the distance between two points?	Distance formula: $distance = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
Let's find the distance between the center $(-1, 5)$ and the endpoint $(-6, 1)$.	$radius = \sqrt{((-6) - (-1))^2 + ((1) - (5))^2}$ $r = \sqrt{(-5)^2 + (-4)^2}$ $r = \sqrt{25 + 16}$ $r = \sqrt{41}$
Now that we know the center and the radius, we can write the equation of our circle.	center = $(-1, 5)$, radius = $r = \sqrt{41}$ equation of a circle: $(x - h)^2 + (y - k)^2 = r^2$ $(x - (-1))^2 + (y - (5))^2 = (\sqrt{41})^2$ $(x + 1)^2 + (y - 5)^2 = 41$

2) What is the center and what is the radius of $(x + 4)^2 + (y - 7)^2 = 100$?

$$x + 4 = 0$$

$$y - 7 = 0$$

$$r^2 = 100$$

$$x = -4$$

$$y = 7$$

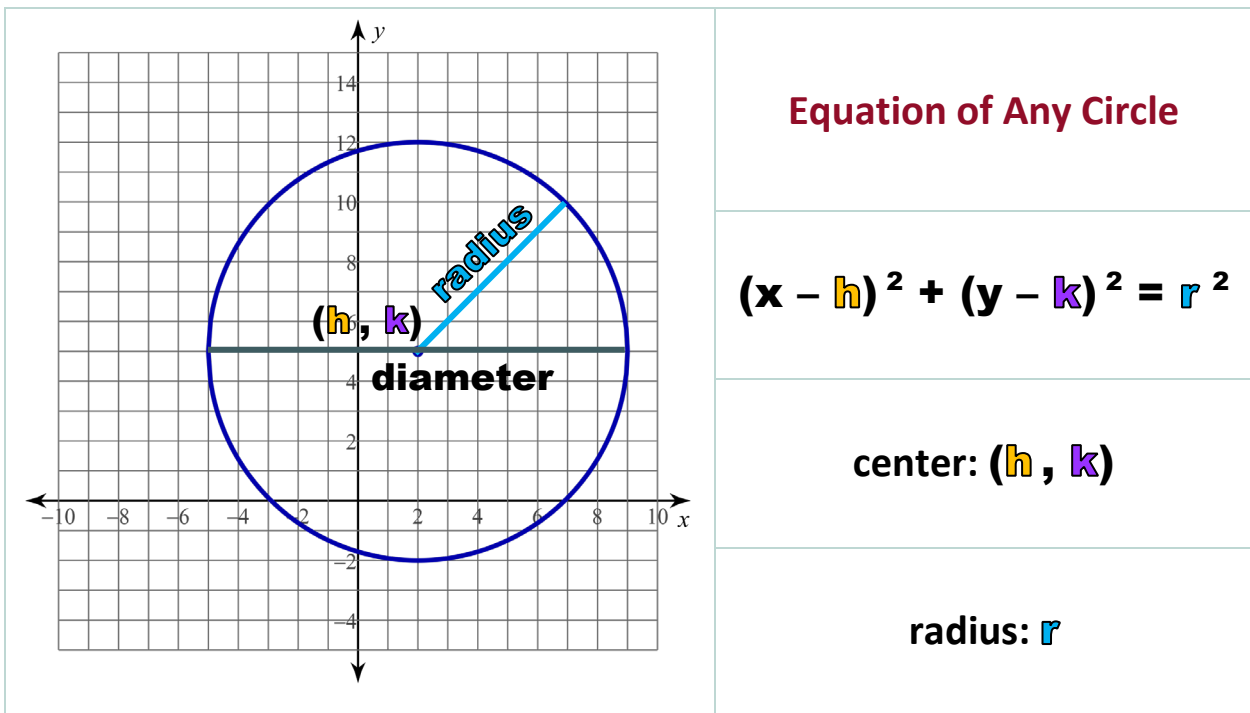
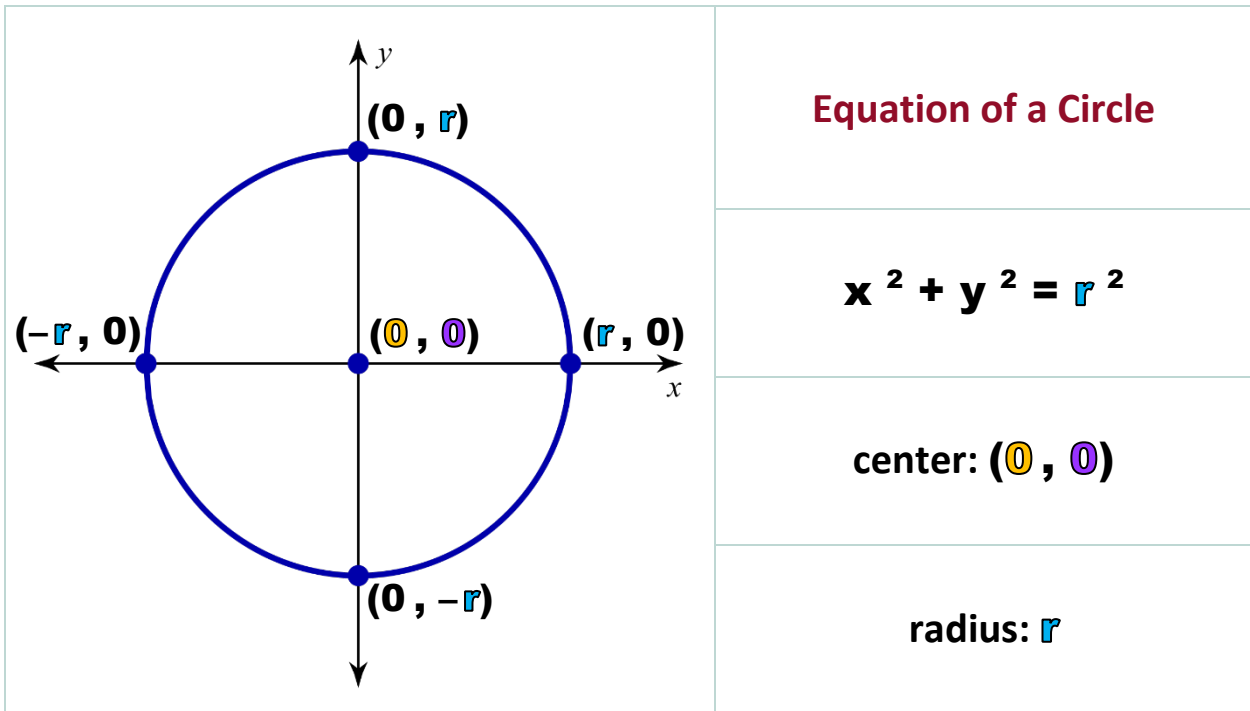
$$r = \sqrt{100}$$

$$\text{center @ } (-4, 7)$$

$$r = 10$$

GUIDED NOTES (MODEL NOTES)

Explain



1) Write the equation of a circle that has $(-6, 1)$ and $(4, 9)$ as the endpoints of its diameter.

$$\text{midpoint} = M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$\text{distance} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

center = find the midpoint of diameter

radius = distance between center & endpoint

$$\text{center} = M = \left(\frac{(-6) + (4)}{2}, \frac{(1) + (9)}{2} \right)$$

$$M = \left(\frac{-2}{2}, \frac{10}{2} \right)$$

$$M = (-1, 5)$$

$$\text{center} = (-1, 5)$$

$$\text{radius} = \sqrt{((-6) - (-1))^2 + ((1) - (5))^2}$$

$$r = \sqrt{(-5)^2 + (-4)^2}$$

$$r = \sqrt{25 + 16}$$

$$r = \sqrt{41}$$

$$\text{radius} = r = \sqrt{41}$$

$$\text{equation of a circle: } (x - h)^2 + (y - k)^2 = r^2$$

$$(x - (-1))^2 + (y - (5))^2 = (\sqrt{41})^2$$

$$(x + 1)^2 + (y - 5)^2 = 41$$

2) What is the center and what is the radius of $(x + 4)^2 + (y - 7)^2 = 100$?

$$x + 4 = 0 \quad y - 7 = 0$$

$$x = -4 \quad y = 7$$

$$\text{center @ } (-4, 7)$$

$$r^2 = 100$$

$$r = \sqrt{100}$$

$$r = 10$$